AMENDMENTS TO THE SPECIFICATION

In the title of the invention:

Method for controlling high speed track locking operations in an optical disc drive including modification of a tracking error signal

In the Summary of Invention:

[0012] The present invention discloses a method for track locking in an optical disc drive. The optical disc drive comprises a pick-up device for reading data from a plurality of tracks of a compact disc. The compact disc comprises a plurality of adjacent track periods, each track period including an on-track period and an off-track period, and the on-track period including only one track. The optical disc drive further comprises a driving device for driving the pick-up device, and a location detecting device for detecting a location of the pick-up device and producing a tracking error signal. When the access device is located at the off-track period, a corrected tracking error signal is formed by taking a reference value as a standard to convert the tracking error signal.

In the Detailed Description:

[0023] As Fig.3 shows, the location device 42 produces the above tracking error signal TE from a corresponding movement of the pick-up device 32 to the track 36. The corresponding movement is produced by a combination of a disc run-out and a movement of the pick-up device 32. The tracking error signal TE, through an amplifying process of an amplifier 48, is converted into a corrected tracking error signal TE_input by a signal correcting unit 50. The control device 40 controls the driving device 38 according to the corrected tracking error signal TE_input in order to lock the pick-up device 32 to a[[n]] target.

[0024] Please refer to Fig.4. Fig.4 is a diagram of signals depicted in Fig.3. As Fig.4 shows, the compact disc 34 comprises a plurality of adjacent track periods 54, each track period 54 comprising an on-track period 56 and an off-track period 58. The tracking error signal TE 44 produced by the location detecting device 42 is a sine wave with the track period 54 as a cycle. On the left side of Fig.4 is a waveform of the tracking error signal TE 44 when the pick-up device 32 moves outward along the compact disc. On the right side of Fig.4 is a waveform of the tracking error signal TE 44 when the pick-up device 32 moves inward along the compact disc 34.

[0025] As Fig.4 shows, when the pick-up device 32 is located at the on-track period 56, the location detecting device 42 produces the tracking error signal TE 44 with a negative half-cycle feedback. When the pick-up device 32 is located at the off-track period 58, the location detecting device 42 produces the tracking error signal TE 44 with a positive half-cycle feedback. When the pick-up device 32 is located at a common border 64 between the on-track period 56 and the off-track period 58, the tracking error signal TE has a reference value 66.

[0026] A main concept~~ion~~ of the present invention is to utilize the tracking error signal TE 44 with a positive half-cycle feedback comprising location error data within the off-track period 58 for producing the above correcting tracking error signal TE_input 52, in order for the control device to control exactly the pick-up device 32 to lock to the target track. When the pick-up device 32 is located at the target track 36a, being within the on-track period 56, the corrected tracking error signal TE_input 52 is the same as an original tracking error signal TE 44. When the pick-up device 32 is located at the target track 36a, being within the off-track period ~~56~~ 58 ~~of the track period 58~~, the corrected tracking error signal TE_input 52 is a mirror signal of the tracking error signal TE 44 by taking the reference value 66 as a

standard to convert the tracking error signal TE. When the pick-up device 32 is near to the target track 36a, the corrected tracking error signal TE_input_52 is smaller. When the pick-up device 32 is far from the target track 36a, the corrected tracking error signal TE_input_52 is larger. The corrected tracking error signal TE_input_52 is approximately proportional to a distance between the pick-up device 32 and the target track 36a, which tends to a linear ideal tracking error signal 68. As such, the corrected tracking error signal TE_input_52 can exactly show the distance between the pick-up device 32 and the target track 36a, in order for the control device 40 to control exactly the pick-up device 32 to lock to the target track 36a.

[0027] In practical applications, the above tracking control method and the correcting method of the tracking error signal is established in a control chip of an optical disc drive. The control chip can differentiate a location of the pick-up device 32, according to a track cross signal 70 (such as Radio Frequency Zero Cross, RFZC signal). As Fig.4 shows, when the RFZC signal 70 is in a high level, the corrected tracking error signal TE_input_52 is determined to be the same as the original tracking error signal TE_44. When the RFZC signal 70 is in a low level, the corrected tracking error signal TE_input_52 is a mirror signal of the tracking error signal TE_44.

[0028] Please refer to Fig.5. Fig.5 is a flow chart of a track locking method according to the present invention. The track locking method comprises:

Step 100: reading the tracking error signal TE_44;

Step 102: reading the track cross signal to differentiate a location of the pick-up device 32 (at the on-track period or the off-track period);

Step 104: producing the corrected tracking error signal TE_input_52, according to the tracking error signal TE_44:

1) when the access device 32 is located at the ending track 36a of the on-track period 56,the corrected tracking error signal TE_input 52 is the same as the tracking error signal TE 44;

2) when the pick-up device 32 is located at the target track 36a of the off-track period 58, the corrected tracking error signal TE_input 52 is a mirror signal of the ~~track-cross signal~~ tracking error signal TE 44 by taking the tracking error signal TE as a standard to convert the tracking error signal TE; and_

Step 106: inputting the corrected tracking error signal TE_input 52 into the control device 40 for controlling the driving device 38 in order to lock to the track by the pick-up device 32.

[0030] In contrast to the prior art, the track locking method of this invention utilizes the tracking error signal TE 44 of the positive half-cycle feedback, that comprises distance data between the pick-up device 32 and the target track 36a, in order to produce the corresponding corrected tracking error signal TE_input 52. Furthermore, when the pick-up head has a high track-crossing speed, the present invention produces an effective brake force, and when the pick-up head has a low track-crossing speed, the system is normally converged by an exact error signal thereby preventing the overshoot or the undershoot state. The experimental result also shows that the present invention can reduce the number of the tracks slided, shorten the track locking time, and enhance the track locking efficiency.

In the Abstract of Disclosure (a clean amended copy is included on a next new page over):

A method for track locking in an optical disc drive. The optical disc drive includes a pick-up device for reading data from a plurality of tracks of a compact disc.

The compact disc includes a plurality of adjacent track periods, each track period including an on-track period and an off-track period, and the on-track period including only one track. The optical disc drive further includes a driving device for driving the pick-up device, and a location detecting device for detecting a location of the pick-up device and producing a tracking error signal. When the access device is located at the off-track period, a corrected tracking error signal is formed by taking a reference value as a standard to convert the tracking error ~~signa~~signal.